资源勘查工程（大数据英才班）专业培养方案

专业名称与代码：资源勘查工程（大数据英才班）081403

专业培养目标：

本专业培养具有正确的世界观、价值观和严谨的科学作风，在德、智、体、美、劳全面发展，系统掌握地球科学与地质资源、地学信息技术等方面的基本理论、方法和技能，获得相关的工程训练，具有较强的大数据管理与分析应用能力，能在资源能源及相关行业从事大数据技术研究、设计、开发与应用的复合型新工科人才。

专业毕业要求：

1. 基础知识：掌握数学与物理等基础知识，并能够将数学、自然科学、工程基础等用于解决地质资源勘查中的复杂、疑难工程问题；对资源大数据技术领域有初步了解。
2. 问题分析：能够应用数学、计算机科学、地质资源勘查、大数据挖掘的基本原理，进行模式识别、三维可视化表达、并通过文献研究分析地质资源勘查中的疑难、复杂工程问题，以获得有效结论。
3. 设计/开发解决方案：能够设计针对地质资源勘查中复杂、疑难工程问题的解决方案，设计满足特定需求的系统、单元（部件）或方法技术流程，并能在设计环节中体现创新意识，考虑“创新、协调、绿色、开放、共享”的十字发展战略。
4. 研究：能够基于科学原理并采用科学方法对地质资源勘查中复杂工程问题进行综合研究，包括设计实验、分析与解释数据、并通过大数据知识发现和模式识别得到合理有效的科学决策依据。
5. 使用现代工具：能够针对地质资源勘查中的复杂工程问题，开发、选择与使用恰当的技术、大数据、现代知识发现工具，包括对复杂工程问题的预测、预警建模及数字模拟，并能够理解其不确定性、局限性和适度性。
6. 专业与社会：能够基于地质资源勘查工程相关背景知识进行合理分析，评价地质资源勘查工程实践和复杂工程问题解决方案，对“创新、协调、绿色、开放、共享”的影响，并理解应承担的责任。
7. 职业规范：具有人文社会科学素养、社会责任感，能够在地质资源勘查工程实践中理解并遵守工程职业道德和规范，履行责任和义务。
8. 个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色，具有良好的团队合作意识与协作精神。
9. 管理与沟通：能够就地质资源勘查中复杂工程、大数据应用等问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。
10. 终身学习：具有自主学习能力和终身学习的意识，有不断学习和主动更新知识的精神，不断增强大数据开发应用能力和深度学习知识点。

序号	毕 业 要 求	实现途径（教学过程）
1	基础知识：掌握数学与物理等基础知识，并能够将数学、自然科学、工程基础等用于解决地质资源勘查中的复杂、疑难工程问题；对资源大数据技术领域有初步了解。	①**课堂教学**：高等数学、概率论与数理统计、线性代数、大学物理、物理实验、大学化学、普通地质学、测量学、、计算机基础、数据库应用、资源地质学、资源勘查理论与方法、地球物理与地球化学原理及应用、数字地质学、C语言程序设计、Pyhthon语言程序设计、•、网络安全、三维地质建模与可视化等 ②**课外学习**：专题讲座、学术报告、组织学生参加各种技能考核等
2	问题分析：能够应用数学、计算机科学、地质资源勘查、大数据挖掘的基本原理，进行模式识别、三维可视化表达、并通过文献研究分析地质资源勘查中的疑难、复杂工程问题，以获得有效结论。	①**课堂教学**：测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、C 语言课程设计、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等 ②**课外学习**：课程作业、大学生科研立项、寻找李四光活动、科技论文报告会、学科前沿调研报告等
3.	设计/开发解决方案：能够设计针对地质资源勘查中复杂、疑难工程问题的解决方案，设计满足特定需求的系统、单元（部件）或方法技术流程，并能在设计环节中体现创新意识，考虑“创新、协调、绿色、开放、共享”的十字发展战略。	①**课堂教学**：测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、C 语言课程设计、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等 ②**课外学习**：课程作业、大学生科研立项、寻找李四光活动、科技论文报告会、学科前沿调研报告等
4	研究：能够基于科学原理并采用科学方法对地质资源勘查中复杂工程问题进行综合研究，包括设计实验、分析与解释数据、并通过大数据知识发现和模式识别得到合理有效的科学决策依据。	①**课堂教学**：测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、C 语言课程设计、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等 ②**课外学习**：课程作业、大学生科研立项、寻找李四光活动、科技论文报告会、学科前沿调研报告等
5	使用现代工具：能够针对地质资源勘查中的复杂工程问题，开发、选	①**课堂教学**：大学英语、数据库原理与应用、地理信息系统原理、数字地质学、C 语言课

序号	毕 业 要 求	实现途径（教学过程）
	择与使用恰当的技术、大数据、现代知识发现工具，包括对复杂工程问题的预测、预警建模及数字模拟，并能够理解其不确定性、局限性和适度性。	程设计、地质云开发与应用课程设计、人工智能课程设计等 ②**课外学习**：课程作业、大学生科研立项、专题讲座、学科前沿调研报告等
6	专业与社会：能够基于地质资源勘查工程相关背景知识进行合理分析，评价地质资源勘查工程实践和复杂工程问题解决方案，对“创新、协调、绿色、开放、共享”的影响，并理解应承担的责任。	①**课堂教学**：资源地质学、水文地质学、工程地质学、环境地质学、测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等 ②**课外学习**：课程作业、大学生科研立项、专题讲座等
7	职业规范：具有人文社会科学素养、社会责任感，能够在地质资源勘查工程实践中理解并遵守工程职业道德和规范，履行责任和义务。	①**课堂教学**：马克思主义基本原理、毛泽东思想和中国特色社会主义体系概论、中国近现代史纲要、思想道德修养与法律基础、军事理论及军事训练、体育、社会调查等 ②**课外学习**：入学教育、大学生心理健康教育、形势与政策教育、就业指导、毕业教育、班主任和辅导员的专题讲座、学术讲座等
8	个人和团队：个人和团队：能够在多学科背景下的团队中承担个体、团队成员以及负责人的角色，具有良好的团队合作意识与协作精神。	①**课堂教学**：C 语言课程设计、测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等 ②**课外学习**：课程作业、大学生科研立项、寻找李四光活动等
9	管理与沟通：能够就地质资源勘查中复杂工程、大数据应用等问题与业界同行及社会公众进行有效沟通和交流，包括撰写报告和设计文稿、陈述发言、清晰表达或回应指令，并具备一定的国际视野，能够在跨文化背景下进行沟通和交流。	①**课堂教学**：经济管理类选修课、测量学实习、地质认识实习（北戴河）、数字地质教学实习（周口店）、地质云开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）等

序号	毕　业　要　求	实现途径（教学过程）
		②**课外学习**：学科前沿调研报告、科技论文报告会、大学生科研立项、学术讲座、撰写科技论文、参加教师科研项目等
10	终身学习：具有自主学习能力和终身学习的意识，有不断学习和主动更新知识的精神，不断增强大数据开发应用能力和深度学习知识点。	①**课堂教学**：毕业实习、毕业设计（论文）、思想道德修养与法律基础、专业英语等 ②**课外学习**：课程作业、学科竞赛、发明创造、科研报告、大学生科研立项等

主干学科：地质资源与地质工程

核心课程：普通地质学、岩石学、结晶学与矿物学、晶体光学及光性矿物学、构造地质学、地层及古生物学、测量学、资源地质学、资源勘查理论与方法、地球物理与地球化学原理及应用、资源环境遥感、数字地质学、Pyhthon 语言程序设计、人工智能基础、网络安全、三维地质建模与可视化、C 语言程序设计、数据结构、计算机基础、数据库应用等。

主要专业实验：地质数据采集与建库、岩矿标本观察与数字化、物化遥数据处理与解译、综合信息预测与应用、可视化技术与应用等

主要实践性教学环节：地质认识实习（北戴河）、地质教学实习（周口店，含数字填图）、岩矿标本观察与数字化（资源勘查工程教学示范中心）、大数据开发与应用（中地数码、自然资源部重点实验室）、大数据存储与管理（中地数码、自然资源部重点实验室）、虚拟仿真与数字模拟（资源勘查工程教学示范中心），毕业实习、毕业论文或设计（中地数码、各大区信息中心、油田计算中心、部重点实验室）等。

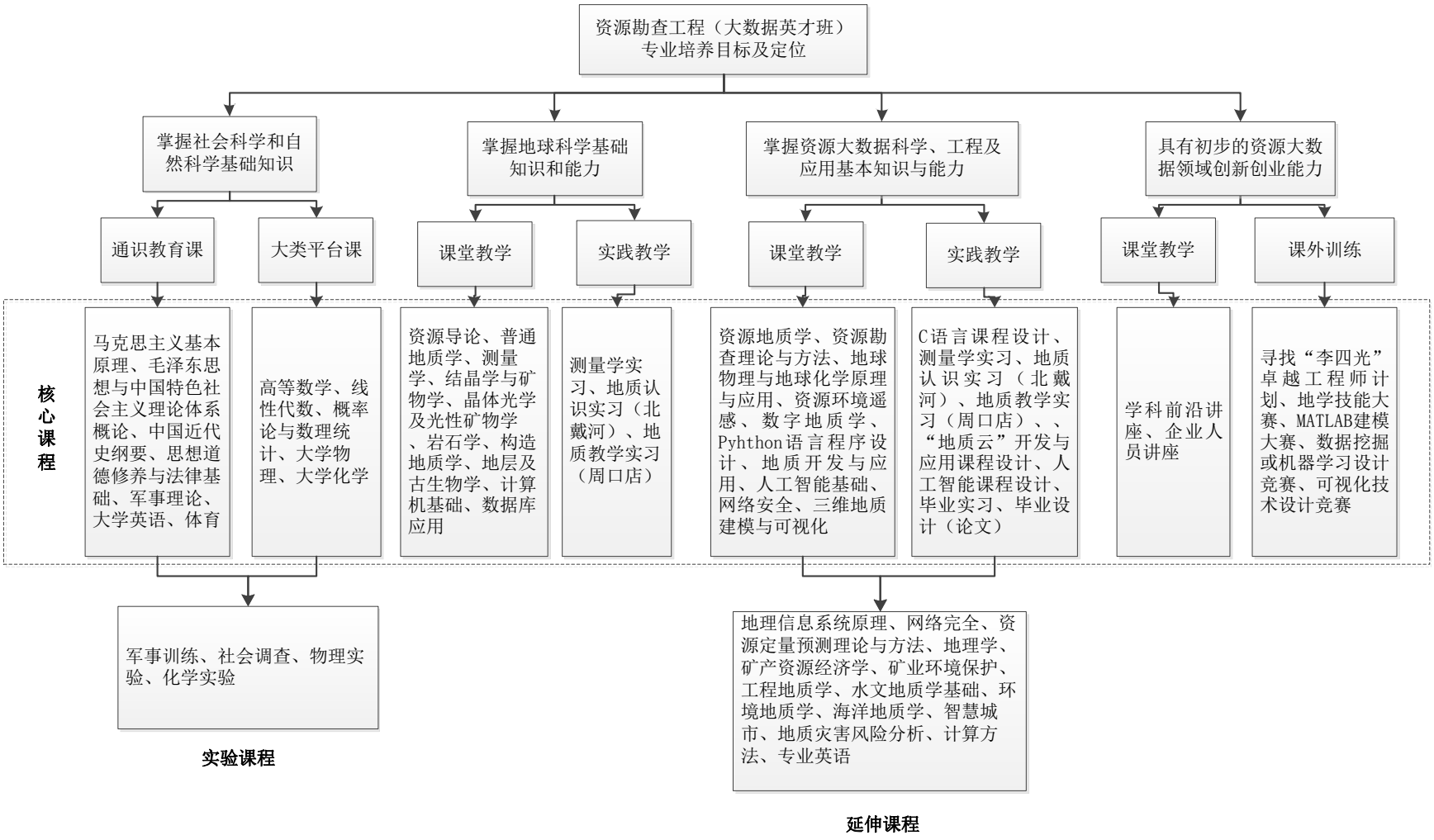
创新创业训练：寻找“李四光”卓越工程师计划、地学技能大赛、MATLAB 数学建模大赛、大数据挖掘与人工智能竞赛

、可视化技术设计竞赛。

毕业学分要求：174

学制与学位：四年，工学学士

相近专业：地质学、勘查技术与工程、应用地球物理、计算机科学与应用。


资源勘查工程（大数据英才班）
专业培养目标及定位
掌握社会科学和自然科学基础知识
掌握地球科学基础知识和能力
掌握资源大数据科学、工程及应用基本知识与能力
具有初步的资源大数据领域创新创业能力
通识教育课
大类平台课
课堂教学
实践教学
课堂教学
实践教学
课堂教学
课外训练
核心课程
马克思主义基本原理、毛泽东思想与中国特色社会主义理论体系概论、中国近代史纲要、思想道德修养与法律基础、军事理论、大学英语、体育
高等数学、线性代数、概率论与数理统计、大学物理、大学化学
资源导论、普通地质学、测量学、结晶学与矿物学、晶体光学及光性矿物学、岩石学、构造地质学、地层及古生物学、计算机基础、数据库应用
测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）
资源地质学、资源勘查理论与方法、地球物理与地球化学原理与应用、资源环境遥感、数字地质学、Pyhthon语言程序设计、地质开发与应用、人工智能基础、网络安全、三维地质建模与可视化
C语言课程设计、测量学实习、地质认识实习（北戴河）、地质教学实习（周口店）、、“地质云”开发与应用课程设计、人工智能课程设计、毕业实习、毕业设计（论文）
学科前沿讲座、企业人员讲座
寻找“李四光”卓越工程师计划、地学技能大赛、MATLAB建模大赛、数据挖掘或机器学习设计竞赛、可视化技术设计竞赛
军事训练、社会调查、物理实验、化学实验
实验课程
地理信息系统原理、网络完全、资源定量预测理论与方法、地理学、矿产资源经济学、矿业环境保护、工程地质学、水文地质学基础、环境地质学、海洋地质学、智慧城市、地质灾害风险分析、计算方法、专业英语
延伸课程

Program for Exploration Engineering of Mineral Resources (Big Data Talent Class)

Specialty and Code: Exploration Engineering of Mineral Resources (Big Data Elite Class) 081403

Education Objective:

The major aim of this program is to train students with correct world view, values and rigorous scientific style, and all around development of moral, intellectual, physical, aesthetics, and labor education. Students are expected to master the basic theories, methods and skills of geosciences, geological resources, and information technology systematically. They will engage in relevant engineering training, achieve strong application capabilities of data management and analysis. The graduates can work in the fields of resources, energy and related industries, and are expected to become interdisciplinary talents of new subject in research, design, development and application of big data technology.

Graduation Requirements:

1. Basic knowledge: Students are required to master the basic theory and knowledge of mathematics and physics, etc., and be able to use mathematics, natural science, engineering foundation to solve complex and difficult engineering problems in geological resources exploration; Students should have a preliminary understanding in the field of big data technology;
2. Problem analysis: In order to obtain effective conclusions, students are expected to have pattern recognition and three-dimensional visualization. They can analyze difficult and complex engineering problems in fields of geological resources exploration through literature research and using basic principles of applied mathematics, physics, chemical, and earth science;
3. Solution design/development: Students are asked to be able to provide solutions for difficult and complex engineering problems in fields of geological resources exploration, design system, unit (component) or technical process which meet the specific needs, and embody the sense of innovation and consider the cross development strategy of innovation, coordination, green, openness and sharing in the design processes;

4. Research: Students are required to be able to carry out the research on complex problems in fields of geological resources exploration engineering based on principles of science and scientific methods which include experimental design, data analysis and interpretation. They can draw reasonable and reliable scientific decision-making basis through big knowledge discovery and pattern recognition;
5. Modern tools application: Students are expected to be able to develop, select and use appropriate technology, big data, and modern knowledge discovery tools to solve out complex problems in fields of geological resources exploration engineering, including prediction, early warning modeling and digital simulation of complex engineering problems. They are expected to understand its uncertainty, limitation and moderation;
6. Profession and society: Students are asked to be able to analyze social problems in fields of geological resources exploration engineering, evaluate impacts on innovation, coordination, green, openness and sharing during the solution process of practice in geological resources exploration engineering. They should understand the responsibilities that they have;
7. Professional standard: Students are expected to obtain humanities and social science literacy and social responsibility, and be able to understand and comply with the engineering ethics and standards in the practice of fields of geological resources exploration engineering, and fulfill the responsibility;
8. Individual and team work: Students are required to be able to assume the role of individuals, team members, and persons in charge, and expected to have good sense of teamwork;
9. Management and communication: Students are asked to be able to effectively communicate and exchange with industry peers and the public on complex engineering and big data application problems in fields of geological resources exploration by the use of report writing, document designing, statement presenting and so on. Students should also have a certain international perspective, and can exchange and communicate in cross-cultural settings;
10. Life-time learning: Students should have autonomous and lifelong learning consciousness, and possess the ability of continuous learning and initiative to update knowledge, and constantly enhance the ability of data development and application.

No.	Graduation requirements	Ways to achieve (teaching process)
1	**Basic knowledge:** Students are required to master the basic theory and knowledge of mathematics and physics, etc., and be able to use mathematics, natural science, engineering foundation to solve complex and difficult engineering problems in geological resources exploration; Students should have a preliminary understanding in the field of big data technology;	① **Classroom Teaching：** Advanced Mathematics, Probability and Mathematics Statistics, Linear Algebra, College Physics, Physics Experiments, College Chemistry, Physical Geology, Surveying, Computer Basis, Database Application, Resource Geology, Theory and Method of Resource Exploration , Principle and Application of Geophysics and Geochemistry, Digital Geology, Pyhthon Language Programming A, Machine Learning, Network Security ， 3D Geological Modeling and Visualization, etc. ②**Out-of-class Learning：** Lectures on special topics, Academic report, Organize students to take part in various skills assessment, etc.
2	**Problem analysis:** In order to obtain effective conclusions, students are expected to have pattern recognition and three-dimensional visualization. They can analyze difficult and complex engineering problems in fields of geological resources exploration through literature research and using basic principles of applied mathematics, physics, chemical, and earth science;	①**Classroom Teaching：** Surveying Practice, Primary Field Training (Beidaihe), Geological Field Training (Zhoukoudian), Course Design for Program Design in C Language, Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Activity for Searching Li Si-guang, Scientific Papers Report, Survey Report of Academic Foreland, etc.
3.	**Solution design/development:** Students are asked to be able to provide solutions for difficult and complex engineering problems in fields of geological resources exploration, design system, unit (component) or technical process which meet the specific needs, and embody the sense of innovation and consider the cross development strategy of innovation, coordination, green, openness and sharing in the design processes;	①**Classroom Teaching：** Surveying Practice, Primary Field Training (Beidaihe), Geological Field Training (Zhoukoudian), Course Design for Program Design in C Language, Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Activity for Searching Li Si-guang, Scientific Papers Report, Survey Report of Academic Foreland, etc.
4	**Research:** Students are required to be able to carry out the research on	①**Classroom Teaching：** Surveying Practice, Primary Field Training (Beidaihe), Geological Field Training (Zhoukoudian), Course Design

No.	Graduation requirements	Ways to achieve (teaching process)
	complex problems in fields of geological resources exploration engineering based on principles of science and scientific methods which include experimental design, data analysis and interpretation. They can draw reasonable and reliable scientific decision-making basis through big knowledge discovery and pattern recognition;	for Program Design in C Language, Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Activity for Searching Li Si-guang, Scientific Papers Report, Survey Report of Academic Foreland, etc.
5	**Modern tools application:** Students are expected to be able to develop, select and use appropriate technology, big data, and modern knowledge discovery tools to solve out complex problems in fields of geological resources exploration engineering, including prediction, early warning modeling and digital simulation of complex engineering problems. They are expected to understand its uncertainty, limitation and moderation;	① **Classroom Teaching：** College English, Principle and Application of Database, Geographic Information System, Digital Geology, Course Design for Program Design in C Language, Development and Application of "Geological Cloud", Course Design of Machine Learning, etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Lectures on special topics, Survey Report of Academic Foreland, etc.
6	**Profession and society:** Students are asked to be able to analyze social problems in fields of geological resources exploration engineering, evaluate impacts on innovation, coordination, green, openness and sharing during the solution process of practice in geological resources exploration engineering. They should understand the responsibilities that they have;	①**Classroom Teaching：** Resource Geology, Hydrogic Geology, Engineering Geology, Environmental Geology, Surveying Practice , Primary Field Training (Beidaihe), Geological Field Training (Zhoukoudian), Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Lectures on special topics, etc.
7	**Professional standard:** Students are expected to obtain humanities and social science literacy and social responsibility, and be able to understand and comply with the engineering ethics and standards in	① **Classroom Teaching：** Principles of Marxism, Introdution to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics, The Essentials of Modern Chinese History, Morality Education and Fundamentals of Law, Military Theory and Training, Physical Education, Social Investigation, etc.

No.	Graduation requirements	Ways to achieve (teaching process)
	the practice of fields of geological resources exploration engineering, and fulfill the responsibility;	②**Out-of-class Learning：** Entrance Education, Student Psychologically Healthy Education, Policy and Situation Education, Guide for Career, Education for Graduation, Special Lectures by Class Leader and Counselor, Academic Lecture, etc.
8	**Individual and team work:** Students are required to be able to assume the role of individuals, team members, and persons in charge, and expected to have good sense of teamwork;	①**Classroom Teaching：** Surveying Practice, Primary Field Training (Beidaihe), Geological Field Training (Zhoukoudian), Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Course homework, Student Research Training Plan, Activity for Searching Li Si-guang, etc.
9	**Management and communication:** Students are asked to be able to effectively communicate and exchange with industry peers and the public on complex engineering and big data application problems in fields of geological resources exploration by the use of report writing, document designing, statement presenting and so on. Students should also have a certain international perspective, and can exchange and communicate in cross-cultural settings;	① **Classroom Teaching ：** Economic Management Elective Course, Surveying Practice, Primary Field Training (Beidaihe), Digital Geology Practice (Zhoukoudian), Development and Application of "Geological Cloud", Course Design of Machine Learning, Graduation Practice, Graduation Design (Thesis), etc. ②**Out-of-class Learning：** Survey Report of Academic Foreland, Meeting on Scientific Research, Academic Lectures, Writing on Scientific Research, Taking part in Scientific Research Projects, etc.
10	**Life-time learning:** Students should have autonomous and lifelong learning consciousness, and possess	①**Classroom Teaching：** Graduation Practice, Graduation Design (Thesis), Morality Education and Fundamentals of Law, Professional English, etc.

No.	Graduation requirements	Ways to achieve (teaching process)
	the ability of continuous learning and initiative to update knowledge, and constantly enhance the ability of data development and application.	②**Out-of-class Learning：** Course homework, Subject contest, Invention and creation, Research report, Student Research Training Plan, etc.

Major Disciplines: Earth Resources and Geological Engineering

Main Courses: Physical Geology, Petrology, Crystallography and Mineralogy, Crystal Optics and Optical Mineralogy, Structural Geology, Stratigraphy and Paleontology, Surveying, Resource Geology, Theory and Method of Resource Exploration , Principle and Application of Geophysics and Geochemistry, Introduction to Remote Sensing of Resources, Digital Geology, Pyhthon Language Programming A, Machine Learning, Network Security ， 3D Geological Modeling and Visualizaiton, Object Oriented Programming, Data Structure, Computer Basis, Database Application, etc.

Lab Experiments: Geological Data Collection and Database Construction, Observation and Digitalization of Rock and Mineral Samples, Physical and Chemical Remote Data Processing and Interpretation, Comprehensive Information Prediction and Application, Visualization Technology and Application, etc.

Practical Work: Primary Field Training (Beidaihe), Digital Geology Practice (Zhoukoudian,, including digital mapping), Observation and Digitalization of Rock and Mineral Samples (Resource Exploration Engineering Teaching Demonstration Center), Development and Applicaiton of Big Data (Zondy Cyber, Key Laboratory of Ministry of Land and Resources), Object Oriented Programming (Zondy Cyber, Key Laboratory of Ministry of Land and Resources), Virtual simulation and digital simulation (Resource Exploration Engineering Teaching Demonstration Center), Graduation Practice and Graduation Design (Thesis) (Zondy Cyber, Regional Information Centers, Oil Field Computing Centers, Key Laboratory of Ministry of Land and Resources), etc.

Innovation and entrepreneurship training: The Excellent Engineer Program for Searching Li Si-guang, Geoscience Skills Competition, MATLAB Modeling Competition, Data Mining or Machine Learning Design Competition, Visualization Technology Design Competition.

Graduation Credit Requirements: 174

Duration and Degree Granted: Four years, Bachelor of Engineering.

Related Specialties: Geology; Exploration Techniques and Engineering; Applied

Geophysics; Computer Science and Applications.

资源勘查工程（大数据英才班）专业课程设置教学计划表

Course Descriptions of Exploration Engineering of Mineral Resources (Big Data Talent Class)

课程类别 Classi-fication		课程编号 Code	课程名称 Course Name	学分 Crs	课内总学时 Hrs	学时分类 Class Hours					先修课程 Prerequisite courses	学期学分分配 Semester Credits							
						课内学时		课外学时											
						讲课 Lec.	课内实验 Lab	实验/科研实践 Lab/Res.	研讨 Dis	素质拓展 Exp		一 1st	二 2nd	三 3rd	四 4th	五 5th	六 6th	七 7th	八 8th
通识教育课 Liberal Education Courses	必修 Compulsory	11706200	马克思主义基本原理概论 Principles of Marxism	3	48	48							3						
		11706500	毛泽东思想和中国特色社会主义理论体系概论 Introduction to Mao Tse-tung Thought and the Theoretical System of Socialism with Chinese Characteristics	4	64	64								4					
		11711800	中国近现代史纲要 The Essentials of Modern Chinese History	2	32	32						2							
		12005200	思想道德修养与法律基础 Morality Education and Fundamentals of Law	3	48	32	16					3							
		12005300	形势与政策 Situation and Policy	2	32	32						每学期平均分配							
		113076*0	体育 Physical Education	4	144	144						1	1	1	1				
		109116*0	大学英语 College English	9	144	144				48		3	3	3					
		14300300	军事理论 Military Theory	2	36	36						2							
	选修 Elective	10815300	管理和项目管理、矿山经济评价（指选） Management and Economic Evaluation of Mine Projection Management	3	48	48										3			
		20216700	矿产资源法律法规（指选） Laws and Regulations Courses	1.5	24	24													1.5
			其他 Other Courses	7.5	120	120													
		小计 Sum		**41**	**740**	**724**	**16**			**48**		**11**	**7**	**8**	**1**	**3**			**3.5**
学科基础课 Disciplinary Fundamental Courses		20212900	资源导论 Introduction to Geological Resources	1	16	16						1							
		21929102	C 语言程序设计 B C Program Design in C Language B	2	32	32		8		8		2							
		212127*2	高等数学 B Advanced Mathematics B	10	160	160						4	6						
		21212802	线性代数 B Linear Algebra B	2.5	40	40								2.5					

	21213502	概率论与数理统计 B Probability and Mathematical Statistics B	2.5	40	40								2.5					
	212130*2	大学物理 B College Physics B	7	112	112								3.5	3.5				
	21216902	物理实验 B Physics Experiments B	1.5	48	4	44							1.5					
	20326902	大学化学 B College Chemistry B	3.5	56	56							3.5						
	20327002	大学化学实验 B College Chemistry Experiments B	1.5	36		36						1.5						
	21130401	测量学 A Surveying A	2	32	32		16						2					
	20119600	普通地质学 General Geology	2.5	40	40		8					2.5						
	20104001	构造地质学 A Structural Geology A	4	64	36	28								4				
	20104600	结晶学及矿物学 Crystallography and Mineralogy	5	80	36	44							5					
	20115500	晶体光学及光性矿物学 Crystal Optics and Optical Mineralogy	3	48	14	34							3					
	20119900	岩石学导论 Introduction to Petrology	5	80	40	40		4	4					5				
	20118300	地层及古生物学 Stratigraphy and Paleontology	3	48	36	12								3				
	21931500	数据结构 Data Structure A	1.5	24	24		16							1.5				
	21931600	计算机基础(操作系统、组成原理) Computer Basis (Operating System and Composition Principle)	1.5	24	24		16							1.5				
	21931700	数据库应用 Database Application	1.5	24	24		16							1.5				
	小计 Sum		**60.5**	**1004**	**766**	**238**	**80**		**12**		**14.5**	**13**	**16.5**	**16.5**				
专业主干课 Main Specialty Courses	20212000	资源地质学 Resource Geology	4	64	64		16								4			
	20210200	资源勘查理论与方法 Theory and Method of Resource Exploration	3	48	48		16								3			
	20230000	地球物理与地球化学原理及应用 Principle and Application of Geophysics and Geochemistry	3	48	48										3			
	20220100	资源遥感导论 Introduction to Remote Sensing of Resources	2.5	40	24	16									2.5			
	20224801	数字地质学 A Digital Geology A	3	48	48		16								3			
	21929201	Pyhthon 语言程序设计 A Pyhthon Language Programming A	2.5	40	40		16							2.5				
	20230100	地质云开发与应用 Development and Application of geologoical cloud	2.5	40	40		16									2.5		
	21936000	人工智能基础 Introduction to Artificial Intelligence	2.5	40	40		16								2.5			

	小计 Sum		**23**	**368**	**352**	**16**					**0**	**0**	**0**	**2.5**	**18**	**2.5**	**0**	**0**
专业选修课 Specialty Elective Courses		可按方向设课，具体见专业选修课列表	12	192	192													
合计 Sub-total			**136.5**	**2304**	**2034**	**254**	**176**	**0**	**60**	**0**	**25.5**	**20**	**24.5**	**27**	**14**	**2.5**		**3.5**
实践环节 Practical Work	44300400	军事训练 Military Training	2	2 周							2							
	41919002	C 语言课程设计 B Course Design for Program Design in C Language B	1.5	1.5 周							1.5							
	41120901	测量教学实习 A Surveying Practice A	1	1 周								1						
	40115200	地质认识实习（北戴河） Primary Field Training (Beidaihe)	2	2 周								2						
	40115602	地质教学实习（周口店）B Geological Field Training (Zhoukoudian) B	4	4 周										4				
	41931800	人工智能课程设计 Course Design of Artificial Intelligence	2	2 周											2			
	40230200	地质云开发与应用课程设计 Course Design of Development and Application of Geologoical Cloud	2	2 周												2		
	40216100	生产实习 Practice for Graduation	8	8 周													8	
	40225500	毕业设计（论文）Design for Graduation (Thesis)	10	10 周														10
	小计 Sum		**32.5**	**32.5 周**							2.5	3		4	4	2	8	8
创新创业自主学习 Freedom study		社会调查 Social Investigation	2	2 周														
		其他(学科竞赛、发明创造、科研报告) Others (Contest, Invention, Innovation and Research Presentation)	3	3 周														
	小计 Sum		**5**	**5 周**														
总计 Total			**174**	**2304**	**2034**	**254**	**176**		**60**		**28**	**23**	**24.5**	**31**	**18**	**4.5**	**8**	**13.5**
可开出专业选修课列表 Specialty Elective Courses	21130701	地理信息系统原理 A Geographical Information System	2.5	40	24	16	8							2.5				
	21931900	网络安全 Network Security	2.5	40	40		16									2.5		
	20229800	三维地质建模与可视化 3D Geological Modeling and Visualization	1.5	24	24		8									1.5		
	20217000	数字地质调查新技术与方法 Regional Geological Survey and New Techniques	2	32	4	28								2				
	20227202	资源信息工程 B Information Engineering of Resources B	1.5	24	24		16									1.5		

	20228300	资源定量预测理论与方法 Theory and Method of Resource Quantitative Prediction	1	16	16		16									1		
	21130600	自然地理学 Geography	2.5	40	32	8									2.5			
	20220000	矿产资源经济学 Economics of Mineral Resources	2.5	40	40												2.5	
	20203700	矿业环境保护 Environment Protection in Mining and Mineral Exploitation	2	32	32													2
	20508400	工程地质学基础 B Engineering geology B	2.5	40	32	8											2.5	
	20409102	水文地质学基础 B Hydrologic Geology B	2.5	40	32	8											2.5	
	20413900	环境地质学 A Environmental geology A	2.5	40	40												2.5	
	20217100	海洋地质学 Marine geology	3	48	48												3	
	21932000	智慧城市 Smart City	1.5	24	24		8									1.5		
	20524700	地质灾害风险分析 Geological Hazard Risk Assessment	2	32	16	16											2	
	21203800	计算方法 computing method	3	48	40	8									3			
	20216800	专业英语 Professional English	2	32	20	12									2			
	创新创业类课程		5															

注：全英课程须在课程名称后打*标出，通识教育选修课学分未列入具体学期，学院须根据学校创新创业自主学习学分认定一览表制订实施细则。

资源勘查工程（大数据英才班）专业课程分类统计

Classified Statistics of Courses

课程类别 / 统计	通识教育课程 Liberal Education Courses		学科基础课 Disciplinary Fundamental Courses	专业主干课 Main Specialty Courses	专业选修课 Specialty Elective Courses	实践环节 Practical Work	创新创业自主学习 Freedom Study	学时总计 Total Hour	学分总计 Total Credits
	必修	选修							
学时/学分	548/29	192/12	1004/60.5	368/23	192/12	32.5 周/32.5	5 周/5	2304+37.5 周	174
学分所占比例	23.4%		35.4%	12.9%	7.0%	18.1%	2.9%		100%

校企联合培养方案

培养目标：

资源勘查工程（大数据英才班）专业培养具有正确的世界观、价值观和严谨的科学作风，在德、智、体、美、劳全面发展，系统掌握地球科学与地质资源、地学信息技术等方面的基本理论、方法和技能，获得相关的工程训练，具有较强的大数据管理与分析应用能力，能在资源能源及相关行业从事大数据技术研究、设计、开发与应用的复合型新工科人才。

培训重点：

在学校与企事业单位联合培养阶段以提升学生实践能力为培训重点，主要包括技术应用能力、设计能力和生产管理能力等方面。

技术应用能力

1. 人工智能主流算法及实现工具的了解
2. 大数据开发主流编程语言的应用
3. 大数据存储与管理平台的搭建
4. 地质云的开发与应用
5. 三维地质建模与可视化的实现

设计能力

1. 工程方案设计
2. 工艺流程
3. 实验设计
4. 软件工程手段
5. 信息处理与数据计算

生产管理

1. 项目管理能力
2. 团队协作能力
3. 成本管理能力
4. 现场生产指导能力

培训阶段：

1. 大三阶段在企事业单位进行项目协同开发实践和生产实习。主要进行专业训练、技能训练，通过学校和企业构建的校企合作平台，在学校导师和企业导师的指导下，完成具体项目的执行，为毕业设计做准备。

2. 大四阶段进行毕业设计。在学校和企业导师指导下完成相关课程设计，提升专业设计能力，并最终完成毕业设计，为就业打下坚实基础。企业对学生进行就业指导和训练，便于学生就业。

课程及学分设置：

课程名称	学分	课内总学时	内容	
			序次	教学基本内容、重点、难点
项目协同开发实践和生产实习	8	8 周	1	启动：制定项目章程，企业征集课题，学生报名参与，导师甄选并组织学生参与项目开题报告。(1 周) 难点：吸引学生并调动学生的积极性。
			2	规划：制定项目计划（1 周） 重点：项目计划制定过程中必须严格把控时间，避免拖拉现象出现。小组划分时，每组的人数也必须严格把控，项目任务必须细化到个人，争取锻炼到每个学生。
			3	执行：指导项目工作，学校导师和企业导师进行线上实习互动。(4 周) 重点：对学生的研究目标，文献检索、资料收集、研究思路、研究内容、工作方案等进行具体的指导。
			4	监督：监督项目工作，学校导师和企业导师进行中期方案评审。(1 周) 重点：对于项目的进展，导师需要认真进行评估，并给学生提出指导性的意见和建议。
			5	收尾：项目评估和收尾，学校导师和企业导师同时进行方案评审。(1 周) 重点：评估过程中，需要认真审查学生的项目内容，从所呈现的 PPT 中细分目标、调研、研究思路、研究内容、研究成果，对学生的工作进行客观性的评价。
			6	企业和学校老师进行本次合作以及后续合作的交流与洽谈。
毕业设计	8	8 周	1	在学校导师和企业导师的共同指导下，开展毕业设计，具体包括选题、开题、资料收集整理与分析、攥写论文、毕业答辩等环节（7 周）
			2	企业对学生进行就业指导和训练,便于学生就业。(1 周)

考核标准及成绩评定：

作业评价细则及得分				
100~90	**89~80**	**79~70**	**69~60**	**59~0**
按时交作业；	按时交作业；	按时交作业；	短时迟交作	不交或严重超

前期调研条理清楚，设计方案合理，研究内容详实，图件精美；最终成果与预期目标吻合；PPT版式合理，格式规范等。	前期调研、设计方案等比较清晰，研究内容比较详实，图件良好；成果实现初期目标；PPT版式比较合理，格式比较规范等。	前期调研、设计方案等基本清晰，研究内容基本合理，图件基本可以反映观点；最终成果实现初期目标；PPT版式比较合理，格式基本规范等。	业；前期调研、设计方案等基本清晰，研究内容偏少，图件合格；最终成果基本实现初期目标；PPT版式基本合理，格式基本规范等。	时迟交作业；前期调研、设计方案等不清晰，研究内容不足，图件表达不清；最终成果达不到初期目标；PPT版式不合理，基本格式不规范等。

工作、生活及安全保障管理：

1、后勤工作安排

考虑到学生集体外出实习，后勤工作最为重要的就在于必备物资的准备，必要物资清单如下：

项目	必备物品
医药用品	晕车药、四季感冒片、止痛药、消毒水、盐酸小檗碱片(止泻) 安瑞克(发烧)、补中益气丸(防中暑)、牛黄解毒丸(防虫，防上火)、藿香正气水、红花油、葡萄糖、创口贴、棉棒、纱布、花露水
日常用品	换洗衣物、鞋袜、洗簌用品、洗衣液、钱包、银行卡等
	毛巾、水杯、卫生纸、伞等
	手机、电脑、相机、充电器等
	面包、巧克力、压缩饼干、饮用水等
活动物品	宣传手册、队旗、队服等
必备证件	身份证、学生证、学校证明、车票等
其他	地图、指南针、旅行日程表、手电筒等

2、学生管理制度

《学生纪律守则》

1）指导老师应对活动全权负责，遇到意外事故应及时采取措施，保证学生实习的顺利进行。

2）各学生必须遵照指导老师的安排，认真按计划完成各项工作，不得擅自行动，如果需要离开，应及时向指导老师报告。

3）学生实习时，应衣着得体，举止文明，谦虚有礼，自觉维护中国地质大学（武汉）的声誉和形象，保持大学生应有的素质和健康的精神风貌，谦虚谨慎，不耻下问。

4）每位学生注意自身安全，不得擅自离开。在实习过程或日常生活应提高警惕，保管好自己的财务，注意个人饮食卫生和交通安全。

5）各项事务应由集体讨论决定，实行少数服从多数的民主集中制原则，学生要服从指导老师的安排。

《安全性原则》

1）学生在出发前应有一定的心理准备，学生必须明确实习期间的艰苦。

2）学生在实习过程中的每一天的生活起居必须由自己独立完成。

3）如果有不适应当地生活条件，应当尽快自我调节，以免给身体造成不必要的伤害。

4）在身体不适的情况下应及时向指导老师反映，不能隐瞒病情。

5）牢记紧急电话：如当地的医院，公安局，政府和支持单位的电话号码和其它紧急号码（报警：110；急救：120；火警：119）。